IN THE CLAIMS

Please amend the claims as follows:

1-28. (Canceled)

29. (Withdrawn) A magnetoresistance effect element, comprising:

a magnetoresistance effect film including,

a nonmagnetic spacer layer, and

first and second ferromagnetic layers separated by the nonmagnetic spacer layer, a magnetization direction of the first ferromagnetic layer being at an angle relative to a magnetization direction of the second ferromagnetic layer at zero applied magnetic field, the second ferromagnetic layer comprising first and second ferromagnetic films antiferromagnetically coupled to one another and an antiferromagnetically coupling film located between and in contact with the first and second ferromagnetic films for coupling the first and second ferromagnetic films together antiferromagnetically so that their magnetizations are aligned antiparallel with one another and remain antiparallel in the presence of an applied magnetic field, the magnetization of the first ferromagnetic layer freely rotating in a magnetic field signal;

a pair of electrodes coupled to the magnetoresistance effect film and having respective inner edges; and

a pair of longitudinal biasing layers for providing bias magnetic fields to the first ferromagnetic layer in parallel with a longitudinal direction of the first ferromagnetic layer and having respective inner edges, said inner edges of the pair of electrodes being disposed between the inner edges of the pair of longitudinal biasing layers.

30. (Withdrawn) A magnetoresistance effect element, comprising:

a nonmagnetic spacer layer;

first and second ferromagnetic layers separated by the nonmagnetic spacer layer, the first ferromagnetic layer having a magnetization direction at an angle relative to a magnetization direction of the second ferromagnetic layer at zero applied magnetic field, the magnetization of the first ferromagnetic layer freely rotating in a magnetic field signal, a magnetoresistance effect-improving layer comprising a plurality of metal films and disposed in contact with the first ferromagnetic layer so that the first ferromagnetic layer is disposed between the nonmagnetic spacer layer and the magnetoresistance effect-improving layer, one of the plurality of metal films disposed in contact with the first ferromagnetic layer contains a metal element of not solid solution with a metal element of the first ferromagnetic layer; and

a nonmagnetic underlayer or a nonmagnetic protecting layer disposed in contact with the magnetoresistance effect-improving layer so that the magnetoresistance effect-improving layer is disposed between the first ferromagnetic layer and the nonmagnetic underlayer or the nonmagnetic protecting layer.

31. (Currently Amended) A magnetoresistance effect head, comprising:

a magnetoresistance effect element including,

a nonmagnetic spacer layer,

first and second ferromagnetic layers separated by the nonmagnetic spacer layer, the first ferromagnetic layer having a magnetization direction at an angle relative to a magnetization direction of the second ferromagnetic layer at zero applied magnetic field, the second ferromagnetic layer comprising first and second ferromagnetic films antiferromagnetically coupled to one another and an antiferromagnetically coupling film located between and in contact with the first and second ferromagnetic films for coupling the

first and second ferromagnetic films together antiferromagnetically so that their magnetizations are aligned antiparallel with one another and remain antiparallel in the presence of an applied magnetic field, the magnetization of the first ferromagnetic layer freely rotating in a magnetic field signal, and

a nonmagnetic [[high-]]conductivity layer disposed in contact with the first ferromagnetic layer so that the first ferromagnetic layer is disposed between the nonmagnetic [[high-]]conductivity layer and the nonmagnetic spacer layer~~; and~~

~~upper and lower magnetic shields sandwiching the magnetoresistance effect element through respective ones of upper and lower magnetic gaps~~, wherein:

the first ferromagnetic layer has a film thickness between 0.5 nanometers and 4.5 nanometers.

32. (Currently Amended) The magnetoresistance effect head of claim 56 ~~31~~, wherein an average surface roughness of an upper surface of the lower magnetic gap is smaller than a thickness of the antiferromagnetically coupling film.

33. (Currently Amended) The magnetoresistance effect head of claim 56 ~~31~~, wherein a distance between a center of film thickness of the first ferromagnetic film and one of the upper and lower magnetic shields through the nonmagnetic [[high-]]conductivity layer is equal or larger ~~smaller~~ than a distance between the center of film thickness of the first ferromagnetic film and another one of the upper and lower magnetic shields through the second ferromagnetic film.

34-36. (Canceled)

37. (Withdrawn) A recording/reproducing magnetic head, comprising:

a substrate;

a lower magnetic shield layer formed on a main surface of the substrate; and

a magnetoresistance effect element formed on the lower magnetic shield layer,

wherein the magnetoresistance effect element includes,

a magnetoresistance effect film having a nonmagnetic spacer layer, and first and second ferromagnetic layers separated by the nonmagnetic spacer layer, a magnetization direction of the first ferromagnetic layer being at an angle relative to a magnetization direction of the second ferromagnetic layer at zero applied magnetic field, the second ferromagnetic layer comprising first and second ferromagnetic films antiferromagnetically coupled to one another and an antiferromagnetically coupling film located between and in contact with the first and second ferromagnetic films for coupling the first and second ferromagnetic films together antiferromagnetically so that their magnetizations are aligned antiparallel with one another and remain antiparallel in the presence of an applied magnetic field, the magnetization of the first ferromagnetic layer freely rotating in a magnetic field signal;

a pair of electrodes coupled to the magnetoresistance effect film and having respective inner edges; and

a pair of longitudinal biasing layers for providing bias magnetic fields to the first ferromagnetic layer in parallel with a longitudinal direction of the first ferromagnetic layer and having respective inner edges, said inner edges of the pair of electrodes being disposed between the inner edges of the pair of longitudinal biasing layers.

38. (Withdrawn) A recording/reproducing magnetic head, comprising:

a substrate;

a lower magnetic shield layer formed on a main surface of the substrate; and

a magnetoresistance effect element formed on the lower magnetic shield layer,

wherein the magnetoresistance effect element includes,

a nonmagnetic spacer layer;

first and second ferromagnetic layers separated by the nonmagnetic spacer layer, the first ferromagnetic layer having a magnetization direction at an angle relative to a magnetization direction of the second ferromagnetic layer at zero applied magnetic field, the magnetization of the first ferromagnetic layer freely rotating in a magnetic field signal, a magnetoresistance effect-improving layer comprising a plurality of metal films and disposed in contact with the first ferromagnetic layer so that the first ferromagnetic layer is disposed between the nonmagnetic spacer layer and the magnetoresistance effect-improving layer, one of the plurality of metal films disposed in contact with the first ferromagnetic layer contains a metal element of not solid solution with a metal element of the first ferromagnetic layer; and

a nonmagnetic underlayer or a nonmagnetic protecting layer disposed in contact with the magnetoresistance effect-improving layer so that the magnetoresistance effect-improving layer is disposed between the first ferromagnetic layer and the nonmagnetic underlayer or the nonmagnetic protecting layer.

39. (Withdrawn) A magnetic storage system, comprising:

a recording/reproducing magnetic head including a substrate, a lower magnetic shield layer formed on a main surface of the substrate, and a magnetoresistance effect element formed on the lower magnetic shield layer,

wherein the magnetoresistance effect element includes a magnetoresistance effect film having a nonmagnetic spacer layer, and first and second ferromagnetic layers separated by the nonmagnetic spacer layer, a magnetization direction of the first ferromagnetic layer being at an angle relative to a magnetization direction of the second ferromagnetic layer at

zero applied magnetic field, the second ferromagnetic layer comprising first and second ferromagnetic films antiferromagnetically coupled to one another and an antiferromagnetically coupling film located between and in contact with the first and second ferromagnetic films for coupling the first and second ferromagnetic films together antiferromagnetically so that their magnetizations are aligned antiparallel with one another and remain antiparallel in the presence of an applied magnetic field, the magnetization of the first ferromagnetic layer freely rotating in a magnetic field signal, and

wherein the recording/reproducing magnetic head further includes,

a pair of electrodes coupled to the magnetoresistance effect film and having respective inner edges; and

a pair of longitudinal biasing layers for providing bias magnetic fields to the first ferromagnetic layer in parallel with a longitudinal direction of the first ferromagnetic layer and having respective inner edges, said inner edges of the pair of electrodes being disposed between the inner edges of the pair of longitudinal biasing layers.

40. (Withdrawn) A magnetic storage system, comprising:

a recording/reproducing magnetic head including a substrate, a lower magnetic shield layer formed on a main surface of the substrate, and a magnetoresistance effect element formed on the lower magnetic shield layer,

wherein the magnetoresistance effect element includes,

a nonmagnetic spacer layer;

first and second ferromagnetic layers separated by the nonmagnetic spacer layer, the first ferromagnetic layer having a magnetization direction at an angle relative to a magnetization direction of the second ferromagnetic layer at zero applied magnetic field, the magnetization of the first ferromagnetic layer freely rotating in a magnetic field signal, a

magnetoresistance effect-improving layer comprising a plurality of metal films and disposed in contact with the first ferromagnetic layer so that the first ferromagnetic layer is disposed between the nonmagnetic spacer layer and the magnetoresistance effect-improving layer, one of the plurality of metal films disposed in contact with the first ferromagnetic layer contains a metal element of not solid solution with a metal element of the first ferromagnetic layer; and

a nonmagnetic underlayer or a nonmagnetic protecting layer disposed in contact with the magnetoresistance effect-improving layer so that the magnetoresistance effect-improving layer is disposed between the first ferromagnetic layer and the nonmagnetic underlayer or the nonmagnetic protecting layer.

41. (Currently Amended) A magnetic storage system, comprising:

a recording/reproducing magnetic head including a substrate, a lower magnetic shield layer formed on a main surface of the substrate, and a magnetoresistance effect element formed on the lower magnetic shield layer,

wherein the magnetoresistance effect element includes, a nonmagnetic spacer layer;

first and second ferromagnetic layers separated by the nonmagnetic spacer layer, the first ferromagnetic layer having a magnetization direction at an angle relative to a magnetization direction of the second ferromagnetic layer at zero applied magnetic field, the second ferromagnetic layer comprising first and second ferromagnetic films antiferromagnetically coupled to one another and an antiferromagnetically coupling film located between and in contact with the first and second ferromagnetic films for coupling the first and second ferromagnetic films together antiferromagnetically so that their magnetizations are aligned antiparallel with one another and remain antiparallel in the presence of an applied magnetic field, the magnetization of the first ferromagnetic layer freely rotating in a magnetic field signal; and

a nonmagnetic [[high-]]conductivity layer disposed in contact with the first ferromagnetic layer so that the first ferromagnetic layer is disposed between the nonmagnetic [[high-]]conductivity layer and the nonmagnetic spacer layer, and

wherein ~~the magnetoresistance effect head further includes upper and lower magnetic shields sandwiching the magnetoresistance effect element through respective ones of upper and lower magnetic gaps~~

the first ferromagnetic layer has a film thickness between 0.5 nanometers and 4.5 nanometers.

42. (Currently Amended) The magnetic storage system of claim 58 ~~41~~, wherein an average surface roughness of an upper surface of the lower magnetic gap is smaller than a thickness of the antiferromagnetically coupling film.

43. (Currently Amended) The magnetic storage system of claim 58 ~~41~~, wherein a distance between a center of film thickness of the first ferromagnetic film and one of the upper and lower magnetic shields through the nonmagnetic [[high-]]conductivity layer is equal or larger ~~smaller~~ than a distance between the center of film thickness of the first ferromagnetic film and another one of the upper and lower magnetic shields through the second ferromagnetic film.

44. (New) A magnetoresistance effect element comprising:

a nonmagnetic spacer layer,

first and second ferromagnetic layer separated by the nonmagnetic spacer layer, the first ferromagnetic layer having a magnetization direction at an angle relative to a magnetization direction of the second ferromagnetic layer at zero applied magnetic field, the

second ferromagnetic layer comprising first and second ferromagnetic films antiferromagnetically coupled to one another and an antiferromagnetically coupling film located between and in contact with the first and second ferromagnetic films for coupling the first and second ferromagnetic films together antiferromagnetically so that their magnetizations are aligned antiparallel with one another and remain antiparallel in the presence of an applied magnetic filed, the magnetization of the first ferromagnetic layer freely rotating in a magnetic field signal, and

a nonmagnetic conductivity layer disposed in contact with the first ferromagnetic layer so that the first ferromagnetic layer is disposed between the nonmagnetic high-conductivity layer and the nonmagnetic spacer layer, wherein:

the first ferromagnetic layer has a film thickness between 0.5 nanometers and 4.5 nanometers.

45. (New) The magnetoresistance effect element of claim 44, wherein the nonmagnetic conductivity layer is formed of a material having a bulk resistivity at room temperature not larger than 10 microohm centimeter.

46. (New) The magnetoresistance effect element of claim 44, wherein:

the first ferromagnetic layer includes a laminate film, and

the laminate film comprises a layer containing NiFe alloy and a layer containing Co.

47. (New) The magnetoresistance effect element of claim 44, wherein the first ferromagnetic layer contains CoFe alloy.

48. (New) The magnetoresistance effect element of claim 44, wherein the nonmagnetic conductivity layer contains a metal element selected from the group consisting of Cu, Au, Ru Ir, Re, Rh, Pt, Pd, Al, Os, and Ni.

49. (New) The magnetoresistance effect element of claim 44, wherein the nonmagnetic conductivity layer comprises a first nonmagnetic conductivity film disposed in contact with the first ferromagnetic layer and a second nonmagnetic conductivity film disposed in contact with the first nonmagnetic conductivity film so that the first nonmagnetic conductivity film is disposed between the first ferromagnetic layer and the second nonmagnetic conductivity film.

50. (New) The magnetoresistance effect element of claim 49, wherein the first nonmagnetic conductivity film contains Cu.

51. (New) The magnetoresistance effect element of claim 50, wherein the second nonmagnetic conductivity layer contains an element selected form the group consisting of Ru, Re, Rh, Pd, Pt, Ir, and Os.

52. (New) The magnetoresistance effect element of claim 44, wherein:

the nonmagnetic conductive layer mainly comprises a first element,

the first ferromagnetic layer mainly comprises a second element, and

a combination of the first element and the second element on an interface between the first ferromagnetic layer and the nonmagnetic conductivity layer does not produce a solid solution.

53. (New) The magnetoresistance effect element of claim 44, further comprising:

an antiferromagnetic layer disposed in contact with and magnetically exchange coupled with one of the first and the second ferromagnetic films for fixing the magnetization of the one of the first and the second ferromagnetic films, the antiferromagnetic layer containing XzMn1-z in which X is an element selected from the group consisting of Ir, Ru, Rh, Pt, Pd and Re and the compositional factor z falls between 4 atomic % and 40 atomic %.

54. (New) The magnetoresistance effect element of claim 44, further comprising:

an antiferromagnetic layer disposed in contact with and magnetically exchange coupled with one of the first and the second ferromagnetic films for fixing the magnetization of the one of the first and the second ferromagnetic films, the antiferromagnetic layer containing XzMn1-z in which X is an element selected from the group consisting of Pt and Pd and the compositional factor z falls between 40 atomic% and 65 atomic %.

55. (New) The magnetoresistance effect element of claim 44, further comprising a layer disposed in contact with the second nonmagnetic conductivity layer so as to sandwich the nonmagnetic conductivity layer with the first ferromagnetic layer and containing an element selected from the group consisting of Ta, Ti, Zr, W, Hf, and Mo.

56. (New) The magnetoresistance effect head of claim 31, further comprising:

upper and lower magnetic shields sandwiching the magnetoresistance effect element through respective ones of upper and lower magnetic gaps.

57. (New) The magnetoresistance effect head of claim 56, further comprising a recording head that comprises:

a lower magnetic pole being common to the upper magnetic shield,

a recording gap layer disposed on the lower magnetic pole, and

an upper magnetic pole disposed on the recording gap layer.

58. (New) The magnetic storage system of claim 41, wherein the magnetoresistance effect head further includes upper and lower magnetic shields sandwiching the magnetoresistance effect element through respective ones of upper and lower magnetic gaps.

59. (New) A magnetic head assembly comprising:

a head slider that comprises a magnetoresistance effect head including:

a nonmagnetic spacer layer,

first and second ferromagnetic layers separated by the nonmagnetic spacer layer, the first ferromagnetic layer having a magnetization direction at an angle relative to a magnetization direction of the second ferromagnetic layer at zero applied magnetic field, the second ferromagnetic layer comprising first and second ferromagnetic films antiferromagnetically coupled to one another and an antiferromagnetically coupling film located between and in contact with the first and second ferromagnetic films for coupling the first and second ferromagnetic films together antiferromagnetically so that their magnetizations are aligned antiparallel with one another and remain antiparallel in the presence of an applied magnetic field, the magnetization of the first ferromagnetic layer freely rotating in a magnetic field signal, and

a nonmagnetic conductivity layer disposed in contact with the first ferromagnetic layer so that the first ferromagnetic layer is disposed between the nonmagnetic conductivity layer and the nonmagnetic spacer layer, and

a suspension arm holding the magnetoresistance effect head, wherein:

the first ferromagnetic layer has a film thickness between 0.5 nanometers and 4.5 nanometers.

60. (New) A magnetic recording apparatus comprising:

a magnetic medium,

a magnetic head assembly that comprises:

a head slider including a magnetoresistance effect head having:

a nonmagnetic spacer layer,

first and second ferromagnetic layers separated by the nonmagnetic spacer layer, the first ferromagnetic layer having a magnetization direction at an angle relative to a magnetization direction of the second ferromagnetic layer at zero applied magnetic field, the second ferromagnetic layer comprising first and second ferromagnetic films antiferromagnetically coupled to one another and an antiferromagnetically coupling film located between and in contact with the first and second ferromagnetic films for coupling the first and second ferromagnetic films together antiferromagnetically so that their magnetizations are aligned antiparallel with one another and remain antiparallel in the presence of an applied magnetic field, the magnetization of the first ferromagnetic layer freely rotating in a magnetic field signal, and

a nonmagnetic conductivity layer disposed in contact with the first ferromagnetic layer so that the first ferromagnetic layer is disposed between the nonmagnetic conductivity layer and the nonmagnetic spacer layer, and

a suspension arm holding the magnetoresistance effect head, wherein:

the first ferromagnetic layer has a film thickness between 0.5 nanometers and 4.5 nanometers.